THE EFFECT OF A SINGLE NUTRITION EDUCATION SESSION ON THE NUTRITION KNOWLEDGE, ATTITUDE AND BEHAVIOR OF FEMALE ADOLESCENT GYMNASTS.

By

Haley Salazar, B.S.

A Project Submitted in Partial Fulfillment of the Requirements

for the Degree of

MASTER OF SCIENCE

in

Dietetics and Nutrition

University of Alaska Anchorage

May 2020

APPROVED:

Leslie Redmond, Ph.D., Committee Chair
Carrie King, Ph.D., Committee Co-Chair
LaDonna Dean, MDA, Committee Member
LeeAnne Carrothers, Ph.D., Director
School of Allied Health
Andre Rosay, Ph.D., Associate Dean for Academic and Student Affairs
College of Health

Abstract

Gymnastics is a complex sport that requires tremendous skill and places high physical demands on the body. This can be especially challenging for adolescent gymnasts, as they need their bodies to perform athletically as they are maturing and growing into adults. Although there is evidence of adequate nutrition supporting athletic ability and proper growth, many young athletes may lack the essential nutrition knowledge, attitudes, and behaviors needed to implement proper nutrition habits. This can be especially true for adolescent female gymnasts as they partake in demanding, rigorous, and specialized trainings beginning in the young stages of life. Gymnastics is also a sport that is judged on aesthetics, causing this population to be at high risk for disordered eating patterns. It is important to assess what these young athletes know about nutrition, how they perceive it, and if they act on it. The purpose of this study was to evaluate the effect of a single nutrition education session on the nutrition knowledge, attitudes and behaviors of female adolescent gymnasts. Participants were asked to complete a survey measuring nutrition knowledge, attitudes, and behaviors immediately prior to a nutrition education session. Immediately after the nutrition education was provided, the same survey was repeated. At a one month follow up, the gymnasts were asked to complete the same survey for the final time. The results of the Friedman test indicated that there was a statistically significant improvement in the participants' nutrition knowledge across the three measurement points (baseline, immediately after education, final survey, x^2 (2.40, n=5) = 8.44, $p < 0.005$). The attitudes ($p = 0.497$) and behaviors ($p = 0.790$) of the participants were not significantly impacted by the nutrition education session. Evidence suggests that providing a single nutrition education session significantly improves the nutrition knowledge, along with retention of the gained knowledge at the one-month follow up, of female adolescent gymnasts.

Table of Contents

List of Tables

Page

List of Appendices

Page

Chapter 1: Introduction

As athletes and adolescents, gymnasts demand a lot from their bodies.[1] Participating in gymnastics increases an athlete's strength, grace and flexibility.[2] Additionally, adolescent gymnasts need their bodies to perform athletically while simultaneously growing and maturing into adulthood. Evaluating their nutrition knowledge, attitudes, and behaviors (KABs) will help assess if they have the knowledge and skills needed to have an adequate diet to support the athletic demands and growth of their bodies.

Gymnasts are athletes that begin training at a young age; training can begin as soon as the child is walking.[2] To be able to reach one's full potential in sports and athletics, it is essential to begin specialized and long duration trainings at an early age.[3] When a child is young, the growth of the brain is rapid, making new skills easier to acquire.[2] Since gymnastics is a sport that requires a lot of technique and is considered to be difficult, the training and learning time is long when compared to most sports.[4] Gymnasts are athletes that train strenuously for five to six hours a day, five to six days a week. Learning the basic skills takes patience, dedication, perseverance, and planning, along with a large amount of time.[4] Due to these high demands, it is important that adolescent gymnasts consider lifestyle behaviors, such as nutrition, to adequately support their training and growth.

Importance of Nutrition for Gymnasts

Adolescent athletes, specifically gymnasts, are a population that is in a vulnerable nutrition state. There are many factors that contribute to this. Some of the factors include aesthetic judgement during competitions, intensive training, energy demands for training that

compete with growth needs, and the lack of formal nutrition education.[3,5] These factors can influence the athlete in a negative way and can lead to disordered eating, body dysmorphia, and misguided nutrition KAB.[1,5]

When a human reaches the developmental stage of adolescence and continues to mature, the individual begins to grow specific skeletal muscle and gain height that follows them into their adult years.[6] This process does not change when the adolescent is an athlete, yet the dietary approaches and behaviors necessary to meet their physiological needs do. Adolescent athletes are a population that needs special nutritional attention. These individuals need to achieve nutritional adequacy in order to meet the demands for normal growth and development, along with their athletic demands; therefore, they have distinctive nutritional needs.[5] Accurate nutrient and energy intake are essential for appropriate development while still progressing athletically.[3] Due to this, training should not only include athletic training, but also nutrition education.[3]

Improper dietary intake and strenuous exercise can lead to fatigue.[7] Without adequate energy, reaching peak performance is unlikely, and as an athlete, reaching peak performance is the ultimate goal. Having an appropriate diet is one of the most important key elements of training for sports.[3] Proper nutrition education can improve the athletes' understanding of how to recognize what their bodies need; it may allow them to identify negative signs from their bodies, like abnormal menstrual cycles.[1]

Providing nutrition skills and education to athletes can help them make healthier and more conscious food choices to support their rigorous training schedules. For example, monitoring of energy intake may be helpful for athletes whose energy expenditure is high. One study, conducted on adolescent male gymnasts in Poland, measured the urine nitrogen levels and 24-hour energy expenditure of the athletes during training at baseline and again after 7 days of

monitoring consumption and supplementing protein and carbohydrate intake after training.[3] Results showed that monitoring and supplementing their protein and carbohydrate intake significantly decreased their urine nitrogen levels, indicating improved balance between the intake and loss of protein.[3,8] Although this target population was specific to adolescent male gymnasts, it provides evidence that monitoring nutritional intake in adolescent gymnasts is important to ensure that their bodies are receiving the energy intake required to replenish protein as it is broken down during training. Though this method of monitoring energy and macronutrient intake has shown to be effective, it can be a time and cost intensive method. Smaller teams may not have the means or resources to accomplish this type of monitoring. Nutrition education programs that emphasize knowledge, attitudes, and behaviors offer a less resource-intensive alternative.

Nutrition education is a well-known and effective form of nutrition intervention. When working with adolescents in particular, it is recommended to approach the intervention with a family-based approach since adolescents may have restricted influence on the food being purchased. It has been shown that programs targeting both parents and adolescents are more effective than programs that target adolescents only.[9] One study evaluated the effect of a weight management program, titled *Fit Families*, and how the program impacted the self-perception of the adolescents.[9] The program provided nutrition education on healthy eating and activity. Children between the ages of 8 and 17 years of age that had a body mass index (BMI) above the 85th percentile were referred by their physicians to participant in this program. It was required that at least one parent or guardian attend the education, and siblings were welcome to attend as well. The seven week intervention consisted of a nutrition education session once a week for 2 hours and 45 minutes, with a registered dietitian nutritionist (RDN) providing the nutrition

portion of the education.[9] Topics covered include nutrition education, physical activity, positive feelings, and goal setting.[9] At the end of the seven week study, participants had significantly improved self-perception of physical appearance; however, outcomes related to nutrition KAB were not measured.

When providing nutrition education to a target population of adolescents, it is also recommended to focus on specific behavior, along with having nutrition and dietetics experts, such as RDNs, deliver the nutrition education.[9] This is why an introduction and utilization of an RDN is important for not only the athletes but the coaches, as well. For the athletes, an RDN provides the tools and knowledge necessary to develop sound nutrition knowledge.[10] Access to the skills of a nutrition and dietetics professional allows the gymnasts to learn in the way that is best for them.[10] For the coaches, it allows them to put forth their time and expertise into what they truly know: the gymnastics. It also ensures that the athletes are provided with the correct, evidenced-based information that will neither hinder their athletic performance nor increase the risk of disordered eating.

In a study by Stewart and colleagues, interviews were conducted with ten Olympic gymnasts across multiple generations. Gymnasts from earlier generations did not have access to an RDN, while the younger generations had an RDN added to their training program.[10] The purpose of the interviews was to identify how the various Olympic gymnasts viewed nutrition. In this study, gymnasts found the nutrition education and RDN to be helpful tools to go along with their athletic training; it allowed the athletes to balance their nutrition and athletic needs. Younger generations of gymnasts expressed that having the opportunity to meet with an RDN allowed them to have and use "structured knowledge," which led them to increased autonomy and the development of healthier habits.[10]

Nutrition education interventions to specifically impact nutrition KABs have been conducted. A study conducted with adolescents in China assessed the impact of nutrition education on their nutrition KABs.[11] This study administered surveys to identify the students' nutrition KABs, using the same survey tool at baseline and post intervention. The intervention was incorporated into the participants' regular schooling schedule and lasted a total of six months, with a 15-minute nutritional class once a week. The intervention also included two 60-minute nutrition education sessions to the students and their parents, with nutritional handouts. It was concluded that the nutrition education administered improved the participants' nutrition KABs on the nutrition topics taught to them.[11]

Another study, in female collegiate volleyball players, assessed their baseline dietary intake and administered a pre-survey during the off-season. After their baseline dietary needs were identified, an RDN provided nutrition education of individualized nutritional needs to each athlete over four visits. During the athletes' next off season, their dietary intakes were assessed once more, along with the completion of the post-survey.[12] Prior to the nutrition education, it was shown that many participants were not meeting their nutritional needs. The nutrition education significantly improved the athlete's intake in their total energy, carbohydrates, and protein.[12] Overall, the sports related nutrition knowledge of the participants was significantly improved.[12] These results indicate that nutrition education interventions can significantly improve athletes' nutritional knowledge and behaviors; however, the target population of this study was female collegiate volleyball players and the results cannot be generalized to other age groups or sports.

Finally, nutrition education is particularly important for female adolescent gymnasts due to an increased risk of disordered eating. When competing, gymnasts are judged not only on the execution of their abilities, but also on the aesthetics of their routines; this can lead to disordered

eating if proper nutritional guidance is not implemented.[1] How a gymnast appears physically, for example their body weight, can be a foundation of stress for the athletes.[10] Gymnastics is not the only sport where female athletes have developed disordered eating; it has impacted female athletes across a variety of sports.[4] Increased desire to achieve a lower body weight and disproportionate exercise to energy intake ratio may be factors that increase the negative attributes that lead to disordered eating.[4] Nutrition education is an important tool to try and combat the negative traits that lead to disordered eating.

In summary, a review of the current literature demonstrates that nutrition education can be a successful strategy to improve nutrition related KABs. With an adolescent target population, it is also recommended to include the adolescents' parents and/or guardians in the nutrition education, since they have the most control over what food is being purchased and kept in the household. However, there is a lack of evidence from the implementation and evaluation of these strategies in female adolescent gymnasts. The current study was proposed to address this gap.

Research Question

- What effect does a single nutrition education session have on the nutrition knowledge, attitude, and behavior of female adolescent gymnasts?

Hypothesis

- Providing a single nutrition education session will positively impact the nutrition knowledge, attitude, and behavior of the participants.

Goal

- Provide the target population with specific nutrition education that will positively impact the nutrition knowledge, attitude, and behavior of the participants.

Objectives

- Provide the target population with the accurate information regarding their specific nutritional needs based on their demographics.
- Evaluate if nutrition knowledge, attitudes, and behavior are impacted in any way from the nutrition education.

Chapter 2: Methods

Study Design

This project was designed to evaluate the nutrition KAB of female adolescent gymnasts enrolled in the training program at Arctic Gymnastics Center of Anchorage, Alaska. The study design selected for this project is a repeated measures evaluation. This project fits within this study design as the goal was to collect data from the sample at three different points throughout the intervention period. Due to all participants remaining in one group and being subjected to the same intervention, repeated measures is recommended because of the anticipated small sample size, as this method can still show efficacy with a small sample.[13]

Questionnaire Selection and Development

The knowledge portion of the KAB survey was adapted from the Nutrition for Sport Knowledge Questionnaire[14]. (Appendix A) Descriptions of the reasons for the adaptations can be found in Table 1. The demographic survey was also adapted, from the same source, to better fit the target population since the original demographic survey was created for use in a different country.[14] The answer options were changed to “true”, “false”, and “not sure”. This was done so the new options were more familiar to the target population to reduce any possible confusion. Questions regarding alcohol consumption were eliminated from the questionnaire due to the participants being under the legal age for alcohol consumption. The syntax of the questionnaire was altered to ensure that the reading grade level was easily understood by the target population.

Other questions that were eliminated from the questionnaire were those that referred to specific numbers and calculations; this was done to ensure the participants would be able to understand each question in addition to this topic not being a focus of this project.

Table 1. Adaptations of the Nutrition for Sport Knowledge Questionnaire

Original	Adaptation	Reason
Answer choices of Agree, Disagree, Not Sure	Answer choices changed to True, False, Not Sure.	New options possibly more familiar to the target population.
Inclusion of questions about alcohol	Removed questions associated with alcohol	Target population in not in an age range that is able to consume alcohol.
Higher grade level syntax	Changed word choices to lower reading level to better fit target population.	To allow questions to be easily understood by the participants.
Inclusion of very specific and numerical questions.	Omission of the questions that involve exact numbers and calculations.	These may be difficult for the participants and this is not an objective of this project.

The attitude and behavior sections of the questionnaire were created by the principal investigator based on the planned nutrition education session. These sections were written to be easily understood by the target population and the questions were answered using a Likert scale. The knowledge section contained a total of 27 questions, while the attitude and behavior sections contained six and eight questions, respectively. The entire questionnaire (Appendix B) was submitted to the faculty of the University of Alaska Anchorage (UAA) Dietetics and Nutrition program to conduct a content validity review. Adjustments were made to the questionnaire (Appendix B) based on the suggestions of the faculty. Changes to the questionnaire included spelling and grammatical corrections, along with different food examples that may be more

suitable for the age range of the target population. It was also suggested to simplify some of the terms used as the target population may not have had the background knowledge to fully understand some of the questions.

IRB Approval and Modification Process

This study was submitted to and approved by the UAA Institutional Review Board (IRB) prior to the initiation of the project (Appendix C). Minor modifications were made at the request of IRB, which included grammatical and syntax suggestions. In addition to the questionnaire review from the UAA faculty, a pilot study was conducted using a sample of the same inclusion criteria to evaluate the face validity of the survey tool. This was done to increase the comprehension of the questionnaire. During the pilot study, the individuals read the questions and made note of anything that they had a hard time understanding. Adjustments were made to the questions based on their feedback. Upon completion of modifications to the questionnaire from the pilot study, changes were resubmitted to and approved by the IRB (Appendix C).

Sample Protocol

Participants were recruited from a local gymnastics training facility. The goal was to recruit 20 gymnasts to participate in the study. The inclusion criteria for the target population of this graduate project was female gymnasts between the ages of 11 and 17. All participants were members of the same training facility. Exclusion criteria included males, other gymnasts that do not fit with in this age range, and any gymnasts that previously participated in the pilot study.

Permission to conduct this study was obtained by the owner and head coach of the facility prior to the submission of this project for IRB approval. After permission from the gym owner was obtained, the primary investigator read the oral recruitment speech (Appendix D) to the gymnasts that fit the inclusion criteria at the start of one of their regularly scheduled practices, approximately two weeks prior to the scheduled nutrition education. They were each then provided with a youth assent form (Appendix E) and parental consent form (Appendix F) to have signed and returned if they desired to participate in the nutrition education. The parental consent form informed the parents and guardians that they were invited to participate in the nutrition education session. In the recruitment speech and written in the assent and consent forms, athletes and parents and guardians were assured that non-participants and/or those that chose to discontinue participation would not be subjected to any changes in coaching or negative consequences. No participation was permitted without both forms signed and submitted prior to the scheduled nutrition education lesson.

Nutrition Education Process

A 60-minute, single nutrition education session was used to decrease inconvenience for the participants and the owner/head coach of the training facility. The nutrition education (Appendix G) session was a one-time, 60-minute lesson provided in a classroom setting. The nutrition education was delivered as a PowerPoint presentation accompanied by educational handouts[15,16] with key points of the lesson and resources to further their education at home (Appendix H). The presentation included topics regarding what a sports dietitian nutritionist is

and what they do, how nutrition relates to gymnasts, how to recognize the needs of their bodies, what ChooseMyPlate© is and specific details about the five food groups, and hydration.

The theory of planned behavior informed the development of the nutrition education presentation. This model focuses on the motivation and ability of the participant to facilitate behavior change.[17] The motivation suggested to the participants is maintaining a healthy body and proper energy for their rigorous training schedule. The composition of the presentation was chosen so the athletes would understand how nutrition is important to them as a gymnast. For ability, the athletes were given nutrition education so they would have the knowledge capacity needed to facilitate the behavior change. It was created to be specifically targeted towards their needs and what they are doing on a daily basis. ChooseMyPlate©[15] was used as the nutrition information provided in the presentation because it is a reliable source that was developed by United States Department of Agriculture and it describes the nutritional needs of the target audience. This is a resource that is easily available to the participants and could be referenced after if they wished to continue their education after the nutrition education.

Prior to the nutritional education presentation, the baseline KAB survey (Appendix B), along with the one-time completion of the demographic section, was administered on paper. Once all participants completed the baseline surveys, the nutrition education was conducted, and the participants partook in two learning activities (Appendix I). These learning activities[16] were chosen because they came from reputable sources, were age appropriate, and included topics that had been covered in the nutrition education. Immediately after the completion of the presentation and learning activities, the athletes completed the KAB survey once more. One month after the nutrition education, the survey was completed a third time to assess if any changes were sustained over time. To the author's knowledge, at the time of this study no studies evaluating

the efficacy of a single, 60-minute nutrition education session had been conducted. An assessment of a shorter duration, one-time nutrition education intervention was needed to identify if this shorter intervention method can positively impact the nutrition KABs of female adolescent gymnasts.

Statistical Analysis

The results were analyzed using SPSS software. Nonparametric statistics were used due to the small size of the sample. Baseline demographics were analyzed first to distinguish similarities and differences within the sample. They were analyzed as continuous and categorical variables to identify means and percentages. The Friedman test was selected to analyze the nutrition KABs because knowledge, attitude, and behavior are continuous variables that were measured within the same sample at three different time points.[18]

Chapter 3: Results

At the initial collection of parental consent and youth assent forms, seven athletes agreed to participate in the nutrition education. Before the initial survey and nutrition education event took place, one individual discontinued gymnastics. At the nutrition education and data collection session, there were six individuals that completed the before and immediately after surveys. However, a participant discontinued gymnastics during the one-month period between the immediately after and final survey administration. Due to that, five individuals were used in the before and immediately after statistical analysis. Another participant chose not to include data for the attitude section on the one-month after the nutritional education survey; therefore, there are responses from only four individuals in the statistical analysis to evaluate long-term impacts of a single nutrition education session on participant attitude. Although parents were invited to the nutrition education session through the parental consent form, no parents were present during the intervention.

There were some data missing from participants electing not to answer certain questions and from the individual that did not complete the study. Because of this, SPSS was not able to calculate the total scores for the attitude and behavior sections for some of the athletes. To ensure that the data could still be analyzed, the total scores were calculated by hand, with no correction made for the missing answers, then included in SPSS so the software was able to conduct the statistical analysis. A value of zero was used in the place of the questions left blank, rather than the participant receiving a zero as their score for that section of the questionnaire.

All participants were gymnasts at Arctic Gymnastics Center (Table 2). Five (83.3%, n=6) of the participants were enrolled in high school, and one (16.7%, n=6) student was enrolled in elementary school. The average age of the participants was 14.5 ± 1.87 years old. Four (66.7%,

n=6) participants had completed a formal nutrition class prior to this study. The study participants trained from 23 hours - 34 hours a week, for an average of 28.96 ± 5.56 hours per week. Between the participants, there was an average of 9 ± 2.19 years of gymnastics training. Four (66.7%, n=6) of the participants reported that having access to nutrition information on healthy eating would be the most useful, with two (33.3%, n=6) saying access to nutrition information for sports training would be more beneficial. Four (80%, n=6) participants reported that cooking classes would be the least helpful regarding nutrition, while one (20%, n=6) reported that an individual session with an RDN would be the least beneficial. Three (50%, n=6) of the participants reported that their coaches had provided them with nutritional information, however, only 2 (33.3%, n=6) report relying on their coach for their nutritional information. Five (83.3%, n=6) of the participants report the primary sources they rely on for nutrition information is an RDN and their doctor.

Table 2. Participant Demographics

Demographic Data	Mean +/- standard deviation
Age (y)	14.5 +/- 1.87
Hours training (h)	28.95 +/- 5.56
Years training (y)	9.0 +/- 2.19
	n (%)
Enrolled in elementary school	1 (16.7%)
Enrolled in high school	5 (83.3%)
Completed a prior nutrition class	4 (66.7%)
Sources of nutritional advice	
Family	4 (66.7%)
Coaches	3 (50%)
Doctor	2 (33.3%)
Friends	1 (16.7%)
Teammates	1 (16.7%)
Dietitian	1 (16.7%)
Sources relied on for nutrition information	
Dietitian	5 (83.3%)
Doctor	5 (83.3%)
Family/Friends	4 (66.7%)
Coach	2 (33.3%)
Social Media	1 (16.7%)
Beneficial nutritional access	
Healthy eating	4 (66.7%)
Sports training	2 (33.3%)
Least beneficial nutritional access	
Cooking class	4 (80%)
One on one with dietitian	1 (20%)

The results of the Friedman test indicated that there was a statistically significant improvement in the participant's nutrition knowledge across the three measurement points (baseline, immediately after education, final survey, x^2 (2.40, n=5) = 8.44, $p < .005$) (Table 3). The nutrition attitudes ($p = 0.497$) (Table 4) and nutrition behaviors ($p = 0.790$) (Table 5) of the participants were not significantly impacted by the nutrition intervention.

Table 3. Participant Nutrition Knowledge

Continuous data	*n*	Mean	Standard deviation	Median	Friedman Test	X^2	*p* - Value
Baseline	6	9.00	3.46	7.00	1.00		
Immediately after	6	13.8	3.83	12.00	2.60		
1 month after	5	13.2	2.17	14.00	2.40	8.444	
							0.015

Table 4. Participant Nutrition Attitude

Continuous data	*n*	Mean	Standard deviation	Median	Friedman Test	X^2	*p* - Value
Baseline	6	15.50	1.00	16.00	1.75		
Immediately after	6	15.25	1.50	15.00	1.88		
1 month after	4	17.00	1.41	16.500	2.38	1.40	
							0.497

Table 5. Participant Nutrition Behavior

Continuous data	*n*	Mean	Standard deviation	Median	Friedman Test	X^2	*p* - Value
Baseline	6	21.6	3.78	24.00	2.20		
Immediately after	6	22.00	5.43	22.00	1.80		
1 month after	5	21.80	2.17	21.00	2.00	0.471	
							0.790

Chapter 4: Discussion

The results of the statistical analysis suggest that providing a one-time, 60-minute nutrition education session to adolescent athletes significantly improves their nutritional knowledge, with their increased knowledge maintained at the one-month follow-up. Attitudes and behaviors of the participants were not significantly impacted.

The results obtained in this project are consistent with what has been shown in the literature. Upon interviewing multiple Olympic gymnasts, it was found that they had complete trust in their coaches and the coaches have an influence on the nutrition education of each of their athletes.[10] This project revealed that 50% (n=3) of the participants have received nutrition advice from their coach. This suggests that since the coach has such an influence on the nutrition education of the athletes, coaches should participate in nutrition education as well. Since the nutrition education provided for this project was held during the athletes' normal practice time to prevent inconvenience, the coach was unavailable to participate.

A similar study looked at the nutrition KAB on adolescents, however used multiple nutrition education interventions.[11] The Wang, et. al. study resulted in significant improvements in the participants' knowledge, attitude and behavior. Although their sample was not athletes, it still indicated that KABs can be positively influenced with a nutrition education intervention. Additionally, the Wang study participants had the same age range, used nutrition education as the intervention, and collected data through pre- and post-surveys. The major difference between this project and the study on the adolescents in China is that the intervention for the adolescents in China took place over a longer period of time and included multiple nutrition education sessions. This suggests the possibility of multiple nutrition education sessions positively impacting all of the KABs, rather than just one nutrition education as utilized in this project. To

the author's knowledge, there were no published studies evaluating the efficacy of a one time, 60-minute nutrition education session at the time of this project. Although the study conducted by Wang included two 60-minute nutrition education sessions with the participants and their parents, the participants were also provided with education once a week throughout the study duration.

A study evaluating collegiate, female volleyball players concluded that providing nutrition education to the athletes significantly improved their overall sport related nutrition knowledge, along with significant improvements in the participants' intake of carbohydrates, protein, and energy.[12] The Valliant, et. al. study suggests that providing athletes with nutrition education is an effective method in improving the athlete's nutrition knowledge and behaviors. However, the sample in this study looks at athletes of a higher age range, with an advanced education level. These athletes also participate in a different sport than this projects sample.

In this present project, it is unknown how much of an influence the adolescents have on the food available to them. Due to the rigorous training of an average of 28.95 +/- 5.56 hours per week and going to school, it is unlikely that the athletes are regularly joining in on grocery shopping and/or assisting in meal preparation. Behaviors and attitudes may be influenced more if the participants are contributing to their meal creations and food purchasing. However, this is the reason that the study assessing *Fit Families* included the parents on the nutrition education; parents/guardians have the final say on food purchases.[9] Although adolescents exhibit freedom as far as food choices and behaviors, a family approach is recommended due to the issue of adolescents having limited decision making for food purchases within the household. This project revealed that 66.7% (n=4) of the participants receive their nutritional advice from family members. In the parental consent forms, parents were informed they were more than welcome to

participate in the nutrition education session, however, no parents were present. This may be an influencing factor of the outcome with significant improvement in knowledge, but no significant improvement in the athlete's attitude or behavior.

Strengths and Limitations

There are limitations within this graduate project. The data collected were self-reported and can be biased since the attitudes and behaviors were not actually observed and the participants had to evaluate themselves. Additionally, the sample size was small. A small sample size can decrease the validity of the study. This was due to the limited number of athletes appropriate and available for this project. Another limitation was the inability for the SPSS software to compute the total for the Likert scales with missing data. To address missing values, a value of zero was used when a question was left blank for any reason rather than the participant receiving an actual score of zero. This may not have reflected their actual nutrition attitudes or behaviors. It is possible that the questionnaire did not capture the significance of a change in their attitudes and behaviors; food may not be something that is significant to them, or that the project duration was not a sufficient amount of time.

Due to 66.7% (n=4) of participants having participated in a nutrition class prior to the initiation of this project, it allows for a potential bias in the nutrition education and knowledge depending on what they have learned previously. There is also the possibility of social desirability bias, especially among adolescent females, which could result in dishonest responses in an attempt to answer in a way that they think they should, based on social norms. Potential bias was minimized by delivering the nutrition education intervention in the homeschool

classroom of the training facility, where each participant had their own individual desk, which increased their privacy and may have led to more confidential and honest answers.

In addition to taking a family-based approach, goal setting and self-monitoring have also been shown to be effective components of nutrition education programs. Goal setting is a valuable tool for behavior change, especially when it is related to dietary intake. Evidence demonstrates that integrating goal setting in interventions has led to participants successfully making improvements towards their goals.[19] Developing clear and attainable goals can increase the athlete's capability of reaching their peak performance.[20] In this present project, the athletes were not asked to create personally specific goals, but the nutrition information and activities were provided to facilitate the thought process on goals specific to their needs. Along with goal setting, self-monitoring has been shown to be an effective tool for encouraging positive change related to food choices.[21] There is sufficient evidence showing that self-monitoring food intake leads to improvements in nutritional outcomes.[21] Although this project did not require the athletes to monitor what they are eating or keep a food log, a behavior Likert scale was used to provide the athletes the opportunity to reflect on their food choices and initiate conscious food choices.

Although the literature that was reviewed indicated that providing multiple nutrition education sessions would result in significant improvements, that was not feasible for this project. Multiple sessions were also not practical for this project due to the timing of the nutrition education falling in line with the competitive season of the athletes. Training time is priority for the athletes during the season.

There are also several strengths in this project. All of the participants in the study sample attended diverse schools in the Anchorage municipality, which indicates that a variety of

backgrounds were included within the data. This helped to increase the likelihood that each of the participants was exposed to different nutritional experiences. This is also the first project of its kind for this target population in Anchorage, Alaska. To the author's knowledge, this is the first study of its kind, to date, to assess the nutrition KAB of this high-risk population. This project also had a high retention rate; there was only one participant that did not complete the study through the final survey.

Chapter 5: Conclusions and Recommendations

A single, 60-minute nutrition education session significantly improved the nutritional knowledge of participants, and the increase was maintained at the one-month follow-up; however, there was no change in the attitudes or behaviors of the participants. This demonstrates potential for this type of program and helps identify different areas for improvement in the future. It may be beneficial to study the impact of multiple nutrition education sessions on the nutrition KAB to assess if this impacts attitudes and behaviors significantly compared to the single nutrition education session.

Additional studies with larger samples should be done to further assess how nutrition education impacts athletes' nutrition knowledge, attitudes, and behaviors. In future studies it would be beneficial to assess if the athletes assist in purchasing their own food and/or packing their own meals/snacks or if the parents/guardians do it for them. Behaviors and attitudes may be impacted more if the participants are frequently engaged in creating and preparing their own meals. Since families and coaches have an influence on the nutrition knowledge and food choices of the athletes, another approach for future studies would be to require families and coaches to participate in the nutrition education as well as the adolescents.

The dissemination plan (Appendix J) for this project includes providing a printed report, with key findings and information highlighted, to the owner and head coaches of Arctic Gymnastics Center. The report will also be sent to the UAA Dietetics and Nutrition Faculty. It is planned to present the results and information from this project at the Alaska Dietetic Association Annual Summit on a date that is to be determined by the committee of the Alaska Dietetic Association.

Dietetics and Nutrition Practice Implications

While conducting the literature review on this topic, there was limited information available on the impact of nutrition education on the nutrition KAB of gymnasts in the United States. There were very similar studies to this one conducted in other geographical locations; however, none that were similar to the methods of this study in the United States. This could indicate the need for further research and development on this topic for the benefit of adolescent athletes of all sports in U.S.

This project provided valuable information to the profession of dietetics and nutrition. A shorter, single session nutrition education intervention is significantly effective in increasing nutrition knowledge, along with maintaining the knowledge in the sample, among female adolescent athletes. Depending on the goals of the dietetics and nutrition professional, a less time-intensive intervention method can be used to increase the nutrition knowledge of adolescents. However, this project also indicates that different methods should be applied if trying to significantly improve the attitudes and behaviors of this population. This project contributes to the literature and provides study design suggestions for professionals in this field on which to base their nutrition education interventions with regard to what they would like to accomplish with their clients/patients. Results of the project also identify what should be taken into consideration when providing education to adolescent athletes that devote a majority of their time to training, for example, inclusion of parents and guardians and lack of time for athlete participation in grocery shopping and meal preparation.

References

1. Fueling Gymnasts. EatRight. https://ncm.webauthor.com/vault/2440/web/files/Client-Ed/SNCM/2015/Gymnasts-4-2015.pdf. Accessed 26 Feb. 2020.

2. Ford LR. Guide to Gymnastics. USA Gymnastics. https://issuu.com/usagymnastics/docs/gymnasticsguide2018?e=1843697/57806809. Accessed 26 Feb. 2020.

3. Sawicki P, Kaczor JJ. The preliminary analysis of protein catabolism and nitrogen balance in young gymnasts. *Science & Sports*. 2018;33(1):33-38. http://www.sciencedirect.com/science/article/pii/S0765159717301338. doi: https://doi.org/10.1016/j.scispo.2017.06.003. Accessed 16 Feb 2020.

4. Sands WA. Why Gymnastics? USA Gymnastics. https://usagym.org/pages/home/publications/technique/1999/3/whygymnastics.pdf. Accessed 26 Feb. 2020.

5. Bingham ME, Borkan ME, Quatromoni PA. Sports nutrition advice for adolescent athletes: A time to focus on food. *American Journal of Lifestyle Medicine.* 2015;9(6):398-402. doi:https://doi-org.proxy.consortiumlibrary.org/10.1177/1559827615598530. Accessed 26 Feb. 2020.

6. Krick RL. Changes in knowledge of the female athlete triad among female high school athletes following a brief nutrition education intervention. [Order No. 10690489]. University of Idaho; 2018. Accessed 26 Feb. 2020

7. O'Connell K. What Causes Fatigue. HealthLine. https://www.healthline.com/symptom/fatigue. Published 2016. Accessed 27 Feb. 2020

8. Assessment of protein and energy nutritional status. *Science Direct.* https://www-sciencedirect-com.proxy.consortiumlibrary.org/topics/medicine-and-dentistry/nitrogen-balance. Published 2013. Accessed 23 Feb. 2020.

9. Archuleta M, VanLeeuwen D, Turner C. Fit Families Program improves self-perception in children. *Journal of Nutrition Education & Behavior.* 2016;48(6):392-396.e1. doi:10.1016/j.jneb.2016.03.012. Accessed 27 Feb. 2020.

10. Stewart C, Schiavon LM, Bellotto ML. Knowledge, nutrition and coaching pedagogy: A perspective from female Brazilian Olympic gymnasts. *Sport, Education and Society.* 2017;22(4):511-527. https://doi.org/10.1080/13573322.2015.1046428. doi: 10.1080/13573322.2015.1046428. Accessed 16 Feb 2020.

11. Wang, D., Stewart, D., Chang, C. et al. Effect of a school-based nutrition education program on adolescents' nutrition-related knowledge, attitudes and behaviour in rural areas of China. *Environ Health Prev Med* (2015) 20: 271. https://doi-org.proxy.consortiumlibrary.org/10.1007/s12199-015-0456-4. Accessed 27 Feb. 2020.

12. Valliant M. Nutrition education by a registered dietitian improves dietary intake and nutrition knowledge of a NCAA female volleyball team. *Nutrients*. June 2012:506-516. doi: https://doi.org/10.3390/nu4060506. Accessed 27 Feb. 2020.

13. Repeated Measures Designs: Benefits, Challenges, and an ANOVA Example. Minitab Blog. https://blog.minitab.com/blog/adventures-in-statistics-2/repeated-measures-designs-benefits-challenges-and-an-anova-example. Accessed February 19, 2020.

14. Trakman et al. Development and validation of a brief general and sports nutrition knowledge questionnaire and assessment of athletes' nutrition knowledge. *Journal of the International Society of Sport Nutrition*. 2018. doi:https://doi.org/10.1186/s12970-018-0223-1. Accessed 27 Feb. 2020.

15. What is MyPlate? Choose MyPlate. https://www.choosemyplate.gov/MyPlate. Published July 19, 2018. Accessed 27 Feb. 2020.

16. Dairy Council. EatSmart. https://nutrition.eatsmart.org/. Accessed 27 Feb. 2020.

17. The Theory of Planned Behavior. Behavioral Change Models. http://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/BehavioralChangeTheories/BehavioralChangeTheories3.html. Accessed February 19, 2020.

18. Pallant J. *SPSS Survival Manual*. 6th ed. New York, NY: McGraw Hill Education; 2016.

19. Behavior Change Strategies. Evidence Analysis Library. https://www.andeal.org/topic.cfm?cat=3946&evidence_summary_id=250785&highlight=goal setting&home=1. Accessed 27 Feb. 2020.

20. Dekker MKJ, Van dB, Denissen AJM, Sitskoorn MM, Van Boxtel, Geert J. M. Feasibility of eyes open alpha power training for mental enhancement in elite gymnasts. *J Sports Sci*. 2014;32(16):1550-1560. https://doi-org.proxy.consortiumlibrary.org/10.1080/02640414.2014.906044. doi: 10.1080/02640414.2014.906044. Accessed 27 Feb. 2020.

21. Academy of Nutrition and Dietetics Evidence Analysis Library. "What is the evidence that the behavioral strategy of self-monitoring, used as a component of a behavioral program, will result in health or food behavior change in adults counseled in an outpatient or clinic setting?" Accessed 27 Feb. 2020.

Appendix A:

Nutrition for Sport Knowledge Questionnaire

Abridged Nutrition for Sport Knowledge Questionnaire (A-NSKQ)	
General Nutrition Knowledge	
Question	***Response***
Protein eaten in excess of bodily needs can lead to fat gain	**Agree**/Disagree/Not Sure
Do you think these foods are high or low in carbohydrate? A Banana	**High**/Low/Not Sure
Do you think these foods are high or low in carbohydrate? ½ cup cooked quinoa	**High**/Low/Not Sure
Fat is required by the body to make cell membranes and molecules involved in immune function	**Agree**/Disagree/Not Sure
Do you think these foods are high or low in fat? 1/2 Cup Cottage cheese	High/**Low**/Not Sure
Do you think these foods are high or low in fat? 1 TBS Polyunsaturated margarine	**High**/Low/Not Sure
Do you think these foods are high or low in fat? 1 TBS honey	High/**Low**/Not Sure
Protein absorption in a single sitting is limited	**Agree**/Disagree/Not Sure
Do you think these foods are high or low in protein? 30g (1 ounce) Yellow Cheese	**High**/Low/Not Sure
. Do you think these foods are high or low in protein? 1 Cup Baked Beans	**High**/Low/Not Sure
. Do you think these foods are high or low in protein? 1/2 Cup Cooked Quinoa	High/**Low**/Not Sure
. Eggs contain all the essential amino acids needed by the body	**Agree**/Disagree/Not Sure
. Thiamine (Vitamin B1) is required for efficient delivery of oxygen to muscles	Agree/**Disagree**/Not Sure
. Vitamins provide the body with energy (kilojoules/calories)	Agree/**Disagree**/Not Sure

. When consumed as part of the diet, pure alcohol (ethanol) contains calories/kilojoules and, therefore, can lead to weight gain	**Agree**/Disagree/Not Sure
. Drinking large amounts of alcohol can reduce recovery from injury	**Agree**/Disagree/Not Sure
. "Binge drinking" (also referred to as heavy episodic drinking) is generally defined as:	Having two or more standard alcoholic drinks on the same occasion/***Having four to five or more standard alcoholic drinks on the same occasion***/Having seven to eight or more standard alcoholic drinks on the same occasion /Not Sure
Sport Nutrition Knowledge	
. Increasing protein in the diet is the main dietary change needed when only muscle gain is desired	Agree/**Disagree**/Not Sure
. Which do you think is the best lunch option for an athlete trying to gain weight (muscle)? Assume they are training in the morning and have already had breakfast and a mid-morning snack:	A 'mass gainer' protein shake and 3 - 4 scrambled eggs/**Pasta with lean mincemeat and vegetable sauce, plus a dessert of fruit, yoghurt and nuts** /A large piece of grilled chicken with a side salad (lettuce, cucumber, tomato)/ A large steak and fried eggs/Not Sure
. When exercising at low intensities, fat provides almost all the substrate needed to cover energy costs	**Agree**/Disagree/Not Sure
. Vegetarian athletes can meet their protein requirements without the use of protein	**Agree**/Disagree/Not Sure
. The protein needs of a 100 kg (220 lb) well trained resistance athlete are closest to:	75 g (2.7 ounces) per day/**130 g (4.6 ounces) per day**/250 g (8.8 ounces) per day/They should eat as much protein as possible/Not sure

. Athletes have increased magnesium needs due to losses in sweat	Agree/**Disagree**/Not Sure
. The optimal calcium intake for athletes aged 15 to 24 years is 500 mg	Agree/**Disagree**/Not Sure
. A physically fit person eating a nutritionally adequate diet can improve their performance by eating more vitamins and minerals	Agree/**Disagree**/Not Sure
. Vitamin C should be routinely supplemented by athletes	Agree/**Disagree**/Not Sure
. Athletes should drink water during activity in order to:	Maintain sweat volume/Prevent dry mouth/**Maintain plasma (blood) volume**/All of the above/Not Sure
. Regarding fluid intake during physical activity, current recommendations encourage athletes to:	Drink 50 - 100 ml (1.7 - 3.3 fluid ounces) every 15 - 20 minutes/**Drink to a plan, based on body weight changes during training sessions performed in a similar climate**/Drink sports drinks (e.g. PowerAde) instead of water when exercising/Suck on ice cubes rather than drinking during practice/Not Sure
. Before competition, athletes should aim to consume foods that are high in:	Fluids, fat and carbohydrate/Fluids, fibre and carbohydrate/**Fluids and carbohydrate**/ Not Sure
. In events last 60 - 90 minutes, 30- 60 g (1.0 - 2.0 ounces) of carbohydrates should be consumed per hour	**Agree**/Disagree/Not Sure
. Consuming carbohydrate during exercise will assist in maintaining blood glucose levels	**Agree**/Disagree/Not Sure
. Which of the following best meets the recommendations for a snack consumed during high-intensity exercise lasting around 90 minutes?	A protein shake/**A ripe banana** /2 Boiled eggs/ A handful of nuts/Not Sure

. How much protein do you think experts recommend athletes should have after completing a resistance exercise session?	1.5g/kg body weight (~ 150 – 130 g/ 5.3 – 10.6 ounces for most athletes) /1.0 g/kg body weight (~ 50 - 100 g /1.9 - 2.3 ounces) for most athletes) /**0.3g/kg body weight (~ 15 - 25 g/0.53 - 0.88 ounces) for most athletes)**/Not Sure
. Supplement labels may contain false or misleading information	**Agree**/Disagree/Not Sure
. The purity and safety of all supplements are tested before sale	Agree/**Disagree**/Not Sure
. In relation to improving sporting performance, which of the following supplements do you think has NOT been supported by a strong body of scientific evidence?	Caffeine / Ferulic acid/ Bicarbonate/ **Leucine**/ Not Sure
. Which of the following supplements do you think is banned by the WORLD ANTI-DOPING AGENCY (WADA)?	Caffeine / Bicarbonate / Carnitine/ ~~Glycerol~~/**Testosterone**/ Not Sure

Appendix B:

Adapted Questionnaire

Demographic Questions

Directions: Read the questions carefully. Answer them as truthfully as you can. If there are any questions you feel uncomfortable with or wish not to answer, just leave it blank and move on to the next question.

1. How old are you? _____
2. What is your gender? _____
3. What country were you born in? _____
4. What is your current zip code? _____
5. What is the highest level of education you have received? Circle one.
    - Completed or enrolled in elementary school
    - Completed or enrolled in high school
6. Have you completed any formal classes in nutrition? Circle one.
    - Yes
    - No
7. What main sport do you participate in? _____
8. On average, how many hours do you practice each week? (Include all fitness activities you participate in both at and away from your training facility)

    _____
9. How many years have you been participating in your selected sport? _____
10. Have any of these individuals ever given you advice regarding your diet? Circle all options that apply to you.
    - Teammates
    - Coaches
    - Dietitian/Nutritionist
    - Doctor

- Teacher
- Friends
- Family

11. From the following options, please rank your top 3 sources you rely on for nutrition information.

_____Academic Journal
_____Coach
_____Dietitian/Nutritionist
_____Doctor
_____Family/Friends
_____Internet
_____Social Media (Facebook, Instagram, Twitter, etc.)
_____General Media (Magazines, TV, Radio)
_____Teammates

12. Does your sporting organization provide you with access to nutrition information or dietitians/nutritionists? Circle one.

- Nutrition information only
- Access to dietitian/nutritionist only
- Nutrition information and access to dietitian/nutritionists
- No, neither of these

13. Do you think that sporting organizations should provide members with access to nutrition information or dietitians/nutritionists? Circle one.

- Nutrition information only
- Access to dietitian/nutritionist only
- Nutrition information and access to dietitian/nutritionist
- No, neither of these

14. What type of support would you find useful? Please rank from 1 (most useful) to 5 (least useful).

_____Access to nutrition information relevant to healthy eating
_____Access to nutrition information relevant to sports/training nutrition
_____Access to group presentations by dietitian/nutritionist
_____Individual consultations by dietitian/nutritionist
_____Cooking classes

Abridged Nutrition for Sports Knowledge Questionnaire (A-NSKQ)

Directions: Please read each question carefully. Answer the questions to the best of your ability. Circle the answer you believe is the correct choice. If there are any questions you feel uncomfortable with or wish not to answer, just leave it blank and move on to the next question.

1. Eating too much protein can cause fat gain.
    a. True
    b. False
    c. Not sure

2. Do you think these foods are high or low in carbohydrates?

    A banana
    a. High
    b. Low
    c. Not sure

    ½ cup cooked quinoa
    a. High
    b. Low
    c. Not sure

3. Fat is needed by the body to make cell membranes and molecules involved in immune function.
    a. True
    b. False
    c. Not sure

4. Do you think these foods are high or low in fat?

    ½ cup of cottage cheese
    a. High
    b. Low
    c. Not sure

    1 tablespoon of margarine
    a. High
    b. Low
    c. Not sure

    1 tablespoon of honey
    d. High
    e. Low
    f. Not sure

5. Protein absorption in a single sitting is limited
    a. True
    b. False
    c. Not sure

6. Do you think these foods are high or low in protein?

    1 ounce of cheese
    a. High
    b. Low
    c. Nit sure

    1 cup baked beans
    a. High
    b. Low
    c. Nit sure

    ½ cup cooked quinoa
    a. High
    b. Low
    c. Not sure

7. Eggs contain all of the essential amino acids (proteins) needed by the body
    a. Ture
    b. False
    c. Not sure

8. Thiamine (Vitamin B1) is required for delivery of oxygen to muscles.
    a. True
    b. False
    c. Not sure

9. Vitamins provide the body with calories.
    a. True
    b. False
    c. Not sure

10. Increasing protein in the diet is the main dietary change needed when you want to gain muscle.
    a. True
    b. False
    c. Not sure

11. What lunch do you think is the best choice for an athlete trying to gain muscle? Assume they trained in the morning and already ate breakfast and mid-morning snack.

    a. A "mass gain" protein shake and 3-4 scrambled eggs.
    b. Pasta with lean turkey meat and vegetable sauce, plus fruit, yogurt, and nuts.
    c. A large piece of grilled chicken with a side salad (lettuce, cucumber, tomato)
    d. A large steak and fried eggs
    e. Not sure

12. When exercising at low intensities, fat provides almost all of the calories needed to have energy.
    a. True
    b. False
    c. Not sure

13. Vegetarian athletes can meet their protein needs without the use of animal protein.
    a. True
    b. False
    c. Not sure

14. Athletes have increased magnesium (important mineral) needs due to losses in sweat.
    a. True
    b. False
    c. Not sure

15. A physically fit person eating a balanced diet can improve their performance by eating more vitamins and minerals.
    a. True
    b. False
    c. Not sure

16. Vitamin C should be supplemented by athletes.
    a. True
    b. False
    c. Not sure

17. Athletes should drink water during activity in order to:

    a. Maintain sweat volume
    b. Prevent dry mouth
    c. Maintain blood volume
    d. All of the above
    e. Not sure

Directions: Read each question carefully. Select the answer by circling which number matches you best. Circling 1 means you do not act in that way. Circling 5 means you do act in that way.

Behavior:

	Never				Always
I eat fruits every day.	1	2	3	4	5
I eat vegetables every day.	1	2	3	4	5
I do not plan meals ahead of time.	1	2	3	4	5
I do not plan snacks ahead of time.	1	2	3	4	5
I choose whole grains over refined grains.	1	2	3	4	5
I use food labels to help choose the foods I eat.	1	2	3	4	5
I try to stay hydrated by drink water.	1	2	3	4	5
I eat from all of the food groups each day.	1	2	3	4	5

Directions: Read each question carefully. Select the answer by circling which number matches you best. Circling 1 means you do not agree. Circling 5 means you do agree.

Attitude:

	Do Not Agree				Agree
Eating a balanced diet will help with my athletic performance.	1	2	3	4	5
The effort it takes to make healthier choices is not worth it.	1	2	3	4	5
In general, I am self-conscious when it comes to speaking about body weight and eating disorders.	1	2	3	4	5
Reading food labels is pointless.	1	2	3	4	5
I find food and nutrition interesting.	1	2	3	4	5
I do not often think about the different ways' food impacts my body and/or health.	1	2	3	4	5

Appendix C:

IRB Approval Forms

Research & Graduate Studies
University of Alaska Anchorage

3211 Providence Drive
Anchorage, Alaska 99508-4614
T 907.786.1099, F 907.786.1791
www.uaa.alaska.edu/research/ric

DATE:	June 15, 2019
TO:	Haley Salazar, B.S.
FROM:	University of Alaska Anchorage IRB
PROJECT TITLE:	[1427921-2] The Effect of A Single Nutrition Education Session on the Nutrition Knowledge, Attitude and Behavior of Female Adolescent Gymnasts
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
DECISION DATE:	June 15, 2019
EXPIRATION DATE:	
REVIEW TYPE:	Expedited Review

Thank you for a copy of these revisions. Your revised proposal received an expedited review and was granted approval. Therefore, in keeping with the usual policies and procedures of the UAA Institutional Review Board, your proposal is judged as fully satisfying the U.S. Department of Health and Human Services requirements for the protection of human research subjects (45 CFR 46 as amended/revised). This constitutes approval for you to conduct the study.

This approval does not have an expiration date. However, we require that you submit a brief summary report of the current status of your project within one year of this approval. At the conclusion of your research, submit the required final report to the IRB. These report forms are available on IRBNet.

Please report promptly proposed changes in the research protocol for IRB review and approval. Also, report to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

On behalf of the Board, I wish to extend my best wishes for success in accomplishing your objectives.

Robert J. Boeckmann, Ph.D.

Chair, Institutional Review Board

Research & Graduate Studies
University of Alaska Anchorage

3211 Providence Drive
Anchorage, Alaska 99508-4614
T 907.786.1099, F 907.786.1791
www.uaa.alaska.edu/research/ric

DATE:	July 18, 2019
TO:	Haley Salazar, B.S.
FROM:	University of Alaska Anchorage IRB
PROJECT TITLE:	[1427921-3] The Effect of A Single Nutrition Education Session on the Nutrition Knowledge, Attitude and Behavior of Female Adolescent Gymnasts
SUBMISSION TYPE:	Amendment/Modification
ACTION:	ADMINISTRATIVE APPROVAL
DECISION DATE:	July 18, 2019
EXPIRATION DATE:	

This letter is in response to your request for Institutional Review Board (IRB) approval of minor modifications to your currently approved proposal. Your request is hereby granted.

On behalf of the entire Board, I wish you continued success with your study.

Robert J. Boeckmann, Ph.D

Chair, Institutional Review Board

Appendix D:

Recruitment Speech

Recruitment Speech

Hello everyone. As most of you all know, I am going to school for dietetics and nutrition. As a part of my school work I have a project that gives me the chance to teach you guys about nutrition that relates to you all as gymnasts. If you guys would like to learn about food and nutrition, then this would be a great chance to do that. It is a project that was made to see if giving you guys information on nutrition changes you attitude, knowledge, and behavior when it comes to what you eat. The information would be given to you guys as a presentation and will take about 1 hour. It will also happen during a normal practice time. If you decide you want to participate, there is a survey that you would fill out before, right after, and one month after the nutrition information.

You absolutely do not have to participate in this project. It is completely voluntary. If you do decide you want to participate now, you can stop participating at any time during the project. Participating is totally up to you and your parents. You also have the option of participating in the nutrition lesson without participating in the study. This would mean you may listen to the nutrition presentation without completing the surveys. If you do or no not decide to participate, this will not impact any coaching I provide from now on.

Here are the permission forms for this project. The consent form is for your parent/guardian to read and sign. The assent form is for you guys to read and sign. These explain more about what we just talked about and what you can expect if you decide to participate. If you would like to participate, please bring the signed forms back to me.

Do you have any questions?

Thank you all for listening

Appendix E:

Youth Assent

THE EFFECT OF A SINGLE NUTRITION EDUCATION SESSION ON THE NUTRITION KNOWLEDGE, ATTITUDE AND BEHAVIOR OF FEMALE ADOLESCENT GYMNASTS.

YOUTH ASSENT FORM

PERSON IN CHARGE OF RESEARCH:

Haley Jensen Salazar, B.S.
Graduate Student, Dietetics and Nutrition
University of Alaska Anchorage
907-602-6676

PURPOSE OF RESEARCH:

This project is managed only by Haley Salazar, a graduate student in the Dietetics and Nutrition department at the University of Alaska Anchorage. The project is studying the nutrition knowledge, attitude, and behavior (KAB) of young female gymnasts.

The purpose of this project is to look at how a nutrition lesson affects your nutrition KAB. It will measure whether athletes your age have the information they need to eat healthy to help them grow and perform.

WHO MIGHT PARTICIPATE?

Participants will be female gymnasts between the ages of 11 and 17. There will be up to 20 participants.

WHAT DO I DO?

I will off a nutrition lesson that will last on hour. Athletes will be asked to take a survey before and after the lesson. Participants will also be asked to take the same survey one month after the class.

HOW WILL THE PROCESS GO?

1. Haley Salazar will ask for your permission to participate in this project. She will also ask you to have your parent/guardian give their permission for you to participate.

2. After consent forms are collected from you and your parent/guardian, then we will set a date for the class during your normal practice times at the gym.

3. At the class, you will complete a short survey right before and right after the nutrition class. The surveys will take about 20 minutes to complete.

4. You can stop participating in this project at any time. There are no penalties if you do not want to participate. There are no penalties if you want to leave the class.

5. The data collected from your surveys will be used to write a report on how a nutrition lesson can affect an athletes' nutrition KAB.

WHERE WILL THIS HAPPEN?

All three surveys and the nutrition class will happen at Arctic Gymnastics Center during a normal scheduled practice.

YOU ARE FREE TO CHOOSE:

Participating in this project is completely your choice. Not participating or dropping out is okay and will not impact any coaching you will receive.

You do not have to answer any question on the survey that you do not want to. There are no penalties if you choose not to answer questions or want to stop participating.

WHAT YOU SAY WILL BE KEPT PRIVATE:

Any identifiable information, like your name, will not be collected. You will be given an ID code that is unique to you. That is the number you will use while filling out your surveys. Only Haley Salazar will have access to the codes and the surveys that have been finished.

RISKS:

During the nutrition lesson, information about disordered eating will be given. If at any time you feel uncomfortable or upset, you may step away from the project until you feel better or stop your participation all together. If at any point information suggesting the harm to or of an adolescent comes up, then Haley Salazar will contact parents/guardians and the professors in charge. There will be resources on how to get help for disordered eating available to the athletes.

BENEFITS:

By participating in this project, you will learn how to keep your body healthy while working to reach your top performance as an athlete.

COMPENSATION:

To thank you for participating, you will be entered in a random drawing to win one of three $25 gift cards to Target.

PEOPLE YOU CAN CALL:

If you have any questions about the research process or your rights as a participant, you can contact:

Research Team:
Haley Salazar
(907)602-6676

Faculty Research Supervisors:

Dr. Leslie Redmond
(907)-786-4490
Dr. Carrie King
(907)-786-6597

UAA Institutional Review Board
(907) 786-1099

SIGNING YOUR NAME:

By signing your name below, you agree to participate in this project. Only agree and sign if you have read this information or you have had the information read to you AND you understand what the information is saying.

Sign your name: _____Date:_____

(A copy of this form will be given to you to keep.)

Appendix F:

Parental Consent

THE EFFECT OF A SINGLE NUTRITION EDUCATION SESSION ON THE NUTRITION KNOWLEDGE, ATTITUDE AND BEHAVIOR OF FEMALE ADOLESCENT GYMNASTS.

CONSENT FORM

PRINCIPAL INVESTIGATOR:

Haley Jensen Salazar
Graduate Student in Dietetics and Nutrition
University of Alaska Anchorage
(907)602-6676

DESCRIPTION:

I am doing research on the nutrition knowledge, attitudes, and behavior (KAB) of female gymnasts, ages 11-17 years. Gymnasts work hard and need to stay healthy. I want to better understand how nutrition education can affect their nutrition KAB. I will ask the athletes to complete a survey and attend a nutrition lesson one time. They will also be asked to complete the same survey right after the lesson. They will be asked to complete the survey one last time, one month after the lesson.

VOLUNTARY NATURE OF PARTICIPATION:

As a parent/guardian, you can attend the class to learn about nutrition for your athlete.

Athlete participation is completely voluntary. You or the athlete can stop participating at any time. There will be no penalties for not participating in this study. You and the athlete are free to choose to participate. You and the athlete are free to drop out at any time.

CONFIDENTIALITY:

No names will be written on the surveys. No identifiable information of the athletes will be collected. Each athlete will be given a unique ID code known only by Haley Salazar. The results of this project will only be reported as a summary. No single survey will be reported. Only Haley Salazar will have access to the ID codes and the completed surveys.

BENEFITS:

The athlete may benefit by learning how diet relates to their growth and athletic performance.

RISKS:

During the nutrition lesson, information on disordered eating will be given. If the athlete does not want to answer certain questions on the survey, she can skip those questions. If an athlete feels uncomfortable, they can step away until they feel comfortable again. Athletes can completely stop their participation at any time during this project without

any penalties. Resources with information on how to get help with disordered eating will be available the athletes.

CONTACTS:

If you have any questions about this project, please feel free to contact the Principal Investigator, listed above, at any time. If you have any questions about the athletes' rights as a participant in this research project, please contact or Dr. Leslie Redmond at 907-786-4490 (lcredmond@alaska.edu), Dr. Carrie King at 907-786-6597 (cdking@alaska.edu) or the UAA IRB office at 907-786-1099 at any time.

SIGNATURE:

Signing below means that you understand everything that has been explained on this form. Also, by signing, you are giving parental/guardian consent for the athlete to participate in this graduate research project. Please feel free to ask any questions about this research project as anytime during this process.

Signature:_____ Date: _____

Name Printed: _____

(A copy of this consent form will be available for your records.)

Appendix G:

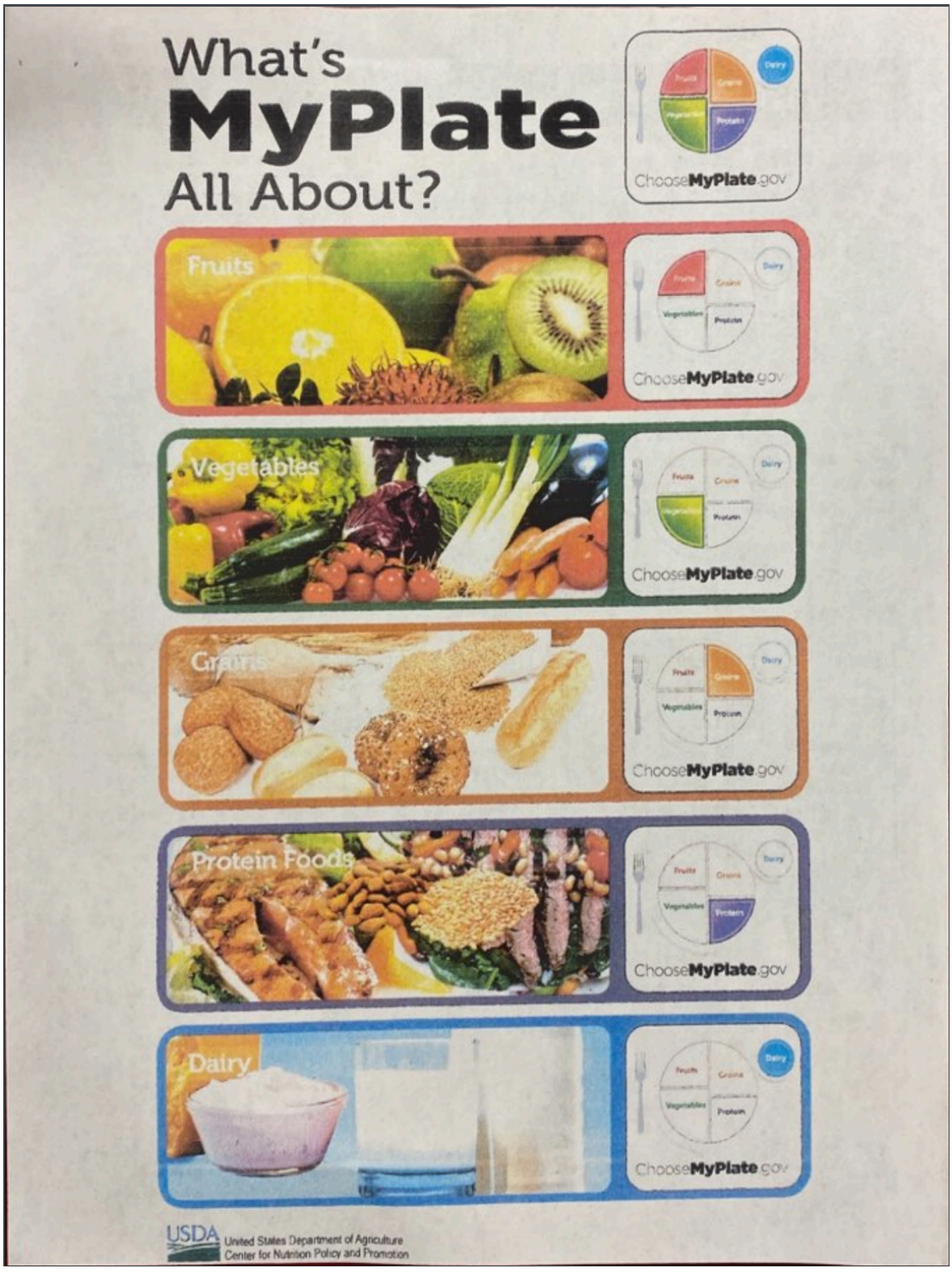
Lesson Plan

Needs Assessment	The needs assessment will focus on educational needs. It will begin with contacting the owners and head coaches of Arctic Gymnastics, Dan and Nichole Alch. I will have him address any nutritional concerns he may have for his athletes or that he has observed. I will also have him explain any common nutritional stigmas there might be within the sport. This way the education can be targeted to the needs of the target population. The target population is adolescent female gymnasts.
Educational Approach	The educational approach will focus on behavior change. The benefits of behavior change based on the education given will be made clear throughout the presentation. This is to facilitate their motivation. For example, athletes always want to perform at their best, so if you make the right nutritional choices you can gain energy to perform at your best. This education will include an interactive activity along with a very short pre-/post- survey.
Behavior-Change Theoretical Basis	The behavior-change theory chosen for this educational delivery is the theory of planned behavior. This was chosen because gymnasts are very dedicated individuals. They are strong willed and if they intend to do something, odds of it happening are high. It is implemented in the education by focusing on the three major factors that impacts an individual's behavioral intention, attitude, subjective norm and perceived behavioral control. Attitude will be brought into the education by explaining how the outcomes of any changes from the education will be desired and beneficial to them. Subjective norm will be included by including their coach and role model in on the education. If he is to agree with the education provided, they may be more motivated to change behaviors. Perceived behavioral control will be implemented by identifying any barriers that may come with any changes. Since they are adolescents ages 11-17, it will be optional for their parents to attend the education. This way the parents can get involved and encourage the children to become more involved with what they are eating.
Learning Objectives	1. Cognitive: Increase the knowledge and understanding of proper MyPlate and healthy/balanced eating. 2. Affective: Provide information that beneficially changes the attitudes and increases the knowledge of the participants. 3. Psychomotor: Provide the information necessary for the participants to feel comfortable and interested participating in and/or helping their parents pack their food.
Key Content Points	• Why balanced diets are beneficial for athletes.

	• How your body communicates with you • Explain what MyPlate is and the basic components of its design/purpose • How hydration is helpful
Materials and Equipment List	Lunch tables (provided at the location) Educational Handouts (found at Washington Dairy Council Website and the Nutrition Care Manual) My computer with visual aid, projector to increase size of the visual aid. Projector is available at the location. Demonstration/follow along activity (found at Washington Dairy Council Website) Pencils for follow along activities. Interactive activity "Toss and Tell" (found at Washington Dairy Council Website) Gymnastics floor for the "Toss and Tell" interactive activity.
Facilities to be Used	The educational session will be held at Arctic Gymnastics Center. It will take place during a normal scheduled practice. The gymnasts will sit at the tables and I will conduct the education facing them. The tables will allow the participants to have space to look at handouts.
References	1. Role of the Sports Dietitian. Sports Nutrition Care Manual. *EatRight*. Accessed 5 Oct. 2018. 2. Fueling Gymnasts. *EatRight*. https://ncm.webauthor.com/vault/2440/web/files/Client-Ed/SNCM/2015/Gymnasts-4-2015.pdf. Accessed 20 Sept. 2018. 3. O'Connell K. What Causes Fatigue. HealthLine. https://www.healthline.com/symptom/fatigue. Published 2016. Accessed April 1, 2019. 4. Kent M. *Food and Fitness: A Dictionary of Diet and Exercise*. 2nd ed. Oxford: Oxford University Press; 2016. 5. What is MyPlate? Choose MyPlate. https://www.choosemyplate.gov/MyPlate. Published July 19, 2018. Accessed 9 Nov. 2018. 6. Staying Hydrated, Staying Healthy. American Heart Association. https://www.heart.org/en/healthy-living/fitness/fitness-basics/staying-hydrated-staying-healthy. Published August 6, 2014. Accessed April 1, 2019. Both learning activities were provided by The Dairy Council website.

Appendix H:

Educational Handouts



The Basics

Nutrition Building Blocks

The nutrients your body needs for health and athletic performance can be sorted into macronutrients and micronutrients. Macronutrients provide fuel and include carbohydrates, protein and fat; these are needed in larger amounts. Micronutrients include vitamins and minerals and are needed in smaller amounts. Adequate water is also essential to your performance.

Macronutrients

CARBOHYDRATE

Carbohydrate is the body's preferred fuel source for all types of physical activity – everything from stealing second base to jumping hurdles, from spiking a volleyball to running a mile. Fifty to 60 percent of your calories should come from carbohydrates. Carbohydrate-rich foods include yogurt, fruit, cereal, pasta, rice, milk and starchy vegetables such as corn, potatoes and peas.

PROTEIN

Protein builds and maintains muscle mass and aids in muscle recovery. Twelve to 15 percent of your total calories should come from protein. Beef, poultry, fish, eggs, beans, nuts, seeds, milk, yogurt and cheese are all good protein sources.

FAT

Fat is needed in every cell of the body and is a concentrated energy source for endurance events such as running a marathon or playing in a long tennis match. Fat should be 20 to 30 percent of your total calories. Sources of healthy fats include vegetable oils, nuts, peanut butter, olives, avocados and fish.

Micronutrients

VITAMINS

Vitamins A, D, E, K, C and the Bs help your body perform processes such as turning carbohydrate into energy. The best way to get vitamins is to eat a diet that includes foods from all the food groups.

MINERALS

Minerals, such as calcium, iron, magnesium and zinc, form such body structures as bone and control certain processes in the body. Eating a variety of foods from all Five Food Groups will help you meet your mineral needs.

Water

Sixty to 75 percent of body weight is water. Adequate hydration helps the body flush toxins. Enjoy water with snacks and throughout the day.

Sample Training Table Menu

Especially during training, your body needs food. This includes choosing a variety of nutrient-rich foods while providing enough calories (fuel). Eating three meals a day plus two to three snacks is the way to supply energy. Here is a sample menu for a typical training day:

Breakfast

- 1 cup whole-grain cereal with sliced banana
- 1 cup milk
- 1 hard-cooked egg
- 1 piece whole-grain toast
- 1 cup fresh berries

Morning Snack

- 7 whole-grain crackers with 2 slices of cheese
- 1 orange

Lunch

- 1 cup lentil soup
- 3 oz. grilled chicken
- 2 cups salad
- 1 Tbsp salad dressing
- 1 cup yogurt
- 1 apple

Afternoon Snack

- 1 cup 100% fruit juice
- 1 cup carrots and cucumbers
- ¼ cup hummus

Dinner

- Refried beans, salsa and cheese rolled in a whole-wheat tortilla
- ½ cup brown rice
- 1 cup sautéed green, red and yellow bell peppers
- 1 cup chocolate milk

Bedtime Snack

optional, check your hunger level

- 8-12 oz. smoothie with fruit, milk and yogurt

Washington State DAIRY COUNCIL www.EatSmart.org. Item #DC46. Developed by Western Dairy Association

The Basics

High Performance Foods Grab-n-Go!

Carbohydrates rule as fuel. Carbohydrates are the body's preferred energy source and the main fuel for working muscles. These carbohydrate-rich foods are quick-to-fix for snacks at home, practice or pre-event. Keep foods cold with ice packs, coolers or Thermos® bottles.

- Yogurt and granola
- Fresh fruit
- Whole-grain bagel
- Pretzels
- Fig Newtons
- Breakfast cereals (single-serve)
- Dried apricots, raisins and nuts
- 100% fruit juice
- Trail mix
- Instant breakfast drinks
- Peanut butter and crackers
- Rice cakes
- String cheese and crackers
- PB & J
- Tortilla with cheese
- Tuna and crackers
- Pudding
- Cherry tomatoes
- Baby carrots and hummus
- Animal crackers
- Smoothies
- Granola bars
- Graham crackers
- Baked sweet potato
- Low-fat popcorn
- Flavored milk

Graham Cracker Scram

- 2 graham crackers
- Peanut butter
- Banana
- Milk

Spread peanut butter on two graham crackers. Put banana slices on top. Enjoy a glass of milk with your snack.

Monkey Mix

Makes 6 half-cup servings

- 1 ¼ cups dried bananas
- 1 cup dried papaya
- 1 cup dried mango
- ¼ cup coconut
- ¼ cup mini chocolate chips

Combine ingredients and enjoy!

Grand - Slam Cracker Stax

Makes 4 Stax

- 12 crackers
- 4 slices of cheese
- 4 cucumber or tomato slices

Start with a cracker. Put a piece of cheese on the cracker. Add another cracker. Add a cucumber or tomato slice (or both). Top with a cracker. Open wide!

For more recipes, visit NationalDairyCouncil.org.

www.EatSmart.org, Item #DC46

Disordered Eating Resources: If you would like to learn more about the signs and symptoms of disordered eating and how to find help, you can call the number listed below or visit the following websites.

NEDA Feeding Hope

Confidential, Toll-Free Hotline: 1-800-931-2237
Monday-Thursday, 9:00AM - 9:00PM
Friday, 9:00 AM – 5:00PM

https://www.nationaleatingdisorders.org/where-do-i-start-0

Eating Disorders Coalition

https://www.eatingdisorderscoalition.org/

The Healthy Teen Project

http://www.healthyteenproject.com/

Eating Disorder Hope

https://www.eatingdisorderhope.com/

Appendix I:

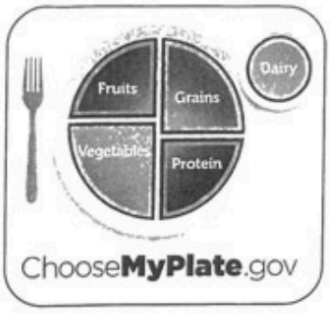
Learning Activities

The Basics

Fuel Up For Peak Performance

Want to feel your best? Look great? Have energy? Eating a balanced diet in combination with regular activity is the way to go. Think nutrient-rich, which means getting the most from the foods you choose. Good nutrition is key for optimal performance; however, research shows that athletes don't need a diet different from what is recommended by the Dietary Guidelines and MyPlate.

Use MyPlate as a visual cue to identify the Five Food Groups and let it serve as a reminder when you build your plate at every meal.



Build a Healthy Plate

- Make half of your plate colorful fruits and vegetables.
- Choose low-fat or fat-free dairy products. They have the same essential nutrients as whole-milk varieties, but less fat and calories.
- Make at least half of your grains whole by choosing 100% whole-grain bread, cereal, rice, pasta, and crackers.
- Enjoy a wider variety of protein-rich foods by including seafood, beans, eggs, and nuts in addition to lean meats and poultry.

For more information and to get your individualized eating plan, visit ChooseMyPlate.gov.

What's a Serving?

Grains
Make at least half your grains whole

1 ounce equals:
- 1 slice of bread
- ½ C cooked cereal
- 1 C cold cereal
- ½ C cooked rice or pasta

Vegetables
Vary your veggies

1 cup equals:
- 2 C raw, leafy greens
- 1 C raw or cooked veggies
- 1 C vegetable juice

Fruits
Focus on Fruits

1 cup equals:
- 1 C fresh, frozen or canned fruit
- 1 medium to large fruit
- 1 C fruit juice
- ½ C dried fruit

Dairy
Get your calcium-rich foods

1 cup equals:
- 1 C milk or yogurt
- 1 ½ oz. natural cheese (Cheddar, mozzarella, Swiss, Parmesan)
- 2 oz. processed cheese (American)

Protein Foods
Go lean with protein

1 ounce equals:
- 1 oz. meat, poultry or fish
- 1 egg
- ¼ cup cooked beans
- 1 Tbsp nut butter
- ½ oz. nuts or seeds

My Three Favorites:

Grains	Vegetables	Fruits	Dairy	Protein Foods
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3

www.EatSmart.org. Item #DC46

A Day In *Your* Life

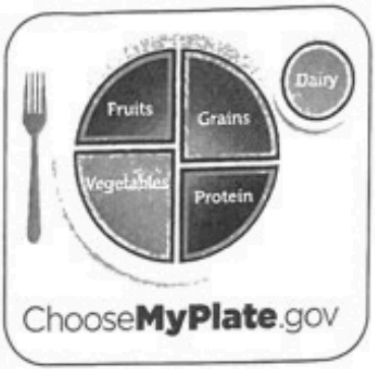
Rate *Your* Plate

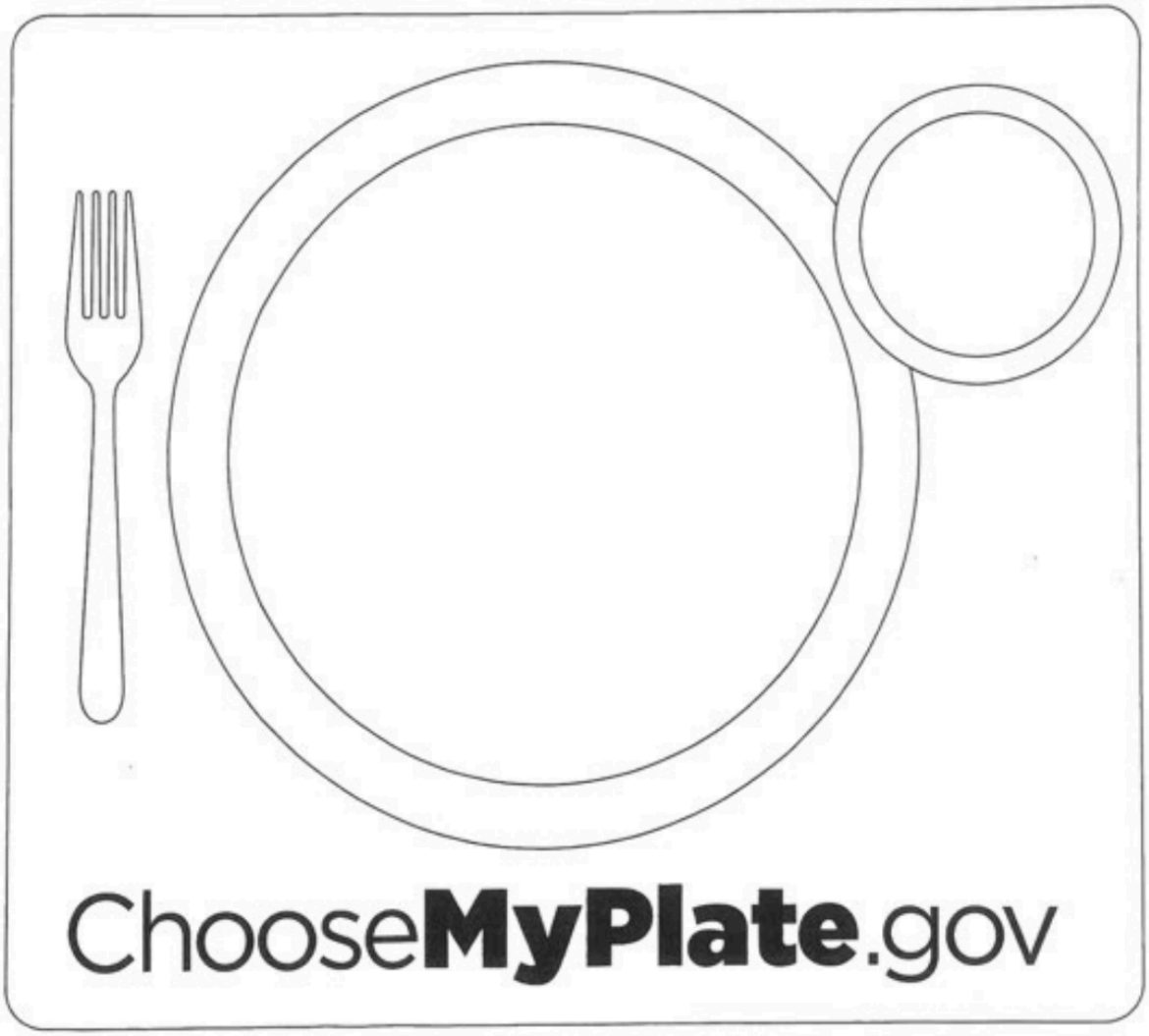
Is *Your* plate in shape? How does it compare to MyPlate? Your daily food choices have a major impact on your body – how you look, feel and perform. Are you making wise decisions to fuel your exercise and promote overall health?

Take a picture of your meal using your phone or camera and paste the picture below.

– OR –

Use the blank MyPlate image below to depict a typical meal of yours. Draw or write what you ate at breakfast, lunch or dinner and include lines to indicate the proportion each food group represents on your plate.





USDA Center for Nutrition Policy and Promotion
www.EatSmart.org, Item #DC46

Dairy Council

Blog Contact Us Sign In Create an Account Cart

MATERIALS CATALOG DAIRY NUTRITION SCHOOLS ABOUT US

TOSS 'N TELL BALL

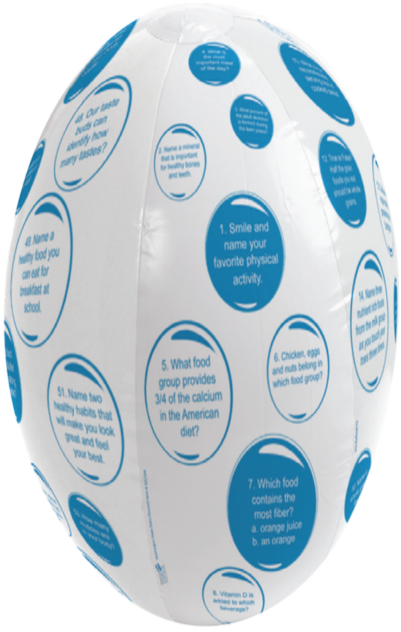
ITEM #: DC104

$ 1.00 ~~was$ 3.00~~

Quantity

1

ADD TO CART



Description | eResources | Reviews

DISCONTINUED ITEM

WHILE SUPPLIES LAST

Grades 4-Adults

Join in the fun by getting students active and answering questions about healthy eating. Toss the ball to classmates and wherever their right thumb lands, they answer that question. Can be used in the classroom or in the gym. Ball comes with an easy reference answer guide for the numbered questions.

Ball size 24".

Appendix J: Dissemination Plans

Dissemination Plan

- Project report distributed to the owner and coaches of Arctic Gymnastics Center, with key results and information highlighted.
- Project report distributed to the UAA Dietetics and Nutrition Faculty.
- Planned presentation of project at the Alaska Dietetic Association Annual Summit on a date that is to be determined by the committee of the Alaska Dietetic Association.